re
Rábago Energy LLC

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

# Executive Summary

The Ohio Legislature is currently considering legislation that would enable electric utility customers to benefit from affordable and clean solar electricity by subscribing to new non-utility investments in **Community Energy** facilities. The legislation calls for a pilot program with a total size of 1,500 MW, equivalent to about 2% of Ohio's retail sales of electricity 149,500,000 MWhs.

My analysis — which relied on conservative data and calculations — found that developing a robust Community Energy program can offer substantial benefits to Ohio's utility customers, including those utility customers that do not participate in the program. The benefits are derived by offsetting the utility's transmission charges, deferring transmission and distribution system upgrades, and avoiding generation costs. These avoided costs can be coupled with indirect benefits like reducing dependency on imported energy, economic development, and job creation that results from building a strong, locally based electricity generation sector, and benefits associated from developing brownfield sites that otherwise have no value and are a blight on Ohio's communities.

This analysis assumes that 1,500 MW of the Community Energy generation would be installed across Ohio with 500 MW installed exclusively on distressed sites, brownfields, or commercial rooftops. The analysis calculates impacts as if the entire program were built out and operated for a full year in the first program year. In reality, it will take some time to build all 1,500 MW of Community Energy generation, which would substantially reduce the overall cost impacts of the entire program. My analysis found that according to the current legislation and when conservatively accounting for the total costs and benefits that 1,500 MW of locally produced Community Energy would bring to the grid, the average impact on Ohio residential customers would be an added monthly bill amount of about 7.5 cents, or 90 cents per year. In sum, the operation of 1,500 MW of Community Energy generation built in Ohio and under the program envisioned would have no significant impact on residential customer rates—under a conservative estimate of benefits, these facilities almost entirely pay for themselves.

In summary, and again assuming the entire multi-year program were built and began operating on the first day the bill is passed, the Ohio Community Energy Pilot Program as proposed in would have about a net overall cost of about $1.8 million, and a rate impact of about $0.75 per customer per month for the average Ohio residential customer.

Again, this result is based on very conservative assumptions. After all reasonable costs and benefits are considered, there is likely NO net cost to Ohio customers from the program proposed in HB 136.

# About the Author

Karl R. Rábago has 35 years of experience in energy regulation and development. He is a former Texas Public Utility Commissioner, Deputy Assistant Secretary at the US Department of Energy, Vice President of Distributed Energy Services at Austin Energy, and Director of Regulatory Affairs for the AES Corporation and AES Wind. Karl also runs his own successful consulting practice, Rábago Energy LLC, and has filed testimony or comments in more than 175 regulatory and legislative proceedings across the country.

re
RÁBAGO ENERGY LLC

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

# Costs and Savings for Community Energy in Ohio

## I. General

### A. How Community Energy Works

Community Energy provides customers access to distributed generation through a subscription business model. Community Energy facilities are small systems permitted through the local jurisdiction and interconnected to the utility's distribution grid. Community Energy makes the benefits of distributed generation available to any customers at their homes or businesses.

Under the subscription model, a developer builds a generation facility and a subscriber organization enrolls customers to receive bill credits based on their share of the facility's output. The utility applies the credits to the customer bill, so a subscriber has a reduced utility bill. Separately, the subscriber pays a portion of that utility savings to the subscriber organization. The difference between the subscriber's savings on their utility bill and the payment to the subscriber organization is the customer's monthly net savings.

Under the subscription model, then, the local utility sees costs in the form of paid credits. It also receives benefits in the form of energy that it does not have to import or generate. Distributed generation also reduces other reduced costs by operating on the distribution side of the electric grid and close to the load served by the energy production. Community Energy projects help utilities save on imported energy costs and transmission costs, and enhance grid reliability by paying for grid upgrades for the distribution system. These investments can improve resilience and reliability and help prepare the grid for further improvements and services like energy storage, energy management, and smart grid management. And they put skilled workers to work in the local economy. Community Energy projects compete for subscribers, so they must offer compelling savings in order to earn enough credits to make the development proposition work.

Thanks to the fact that each Community Energy project enrolls many customers, often of different types (large and small businesses, residential customers, and others), and because the projects can be sited in many locations with the support of local communities, they bring benefits which outweigh their costs.

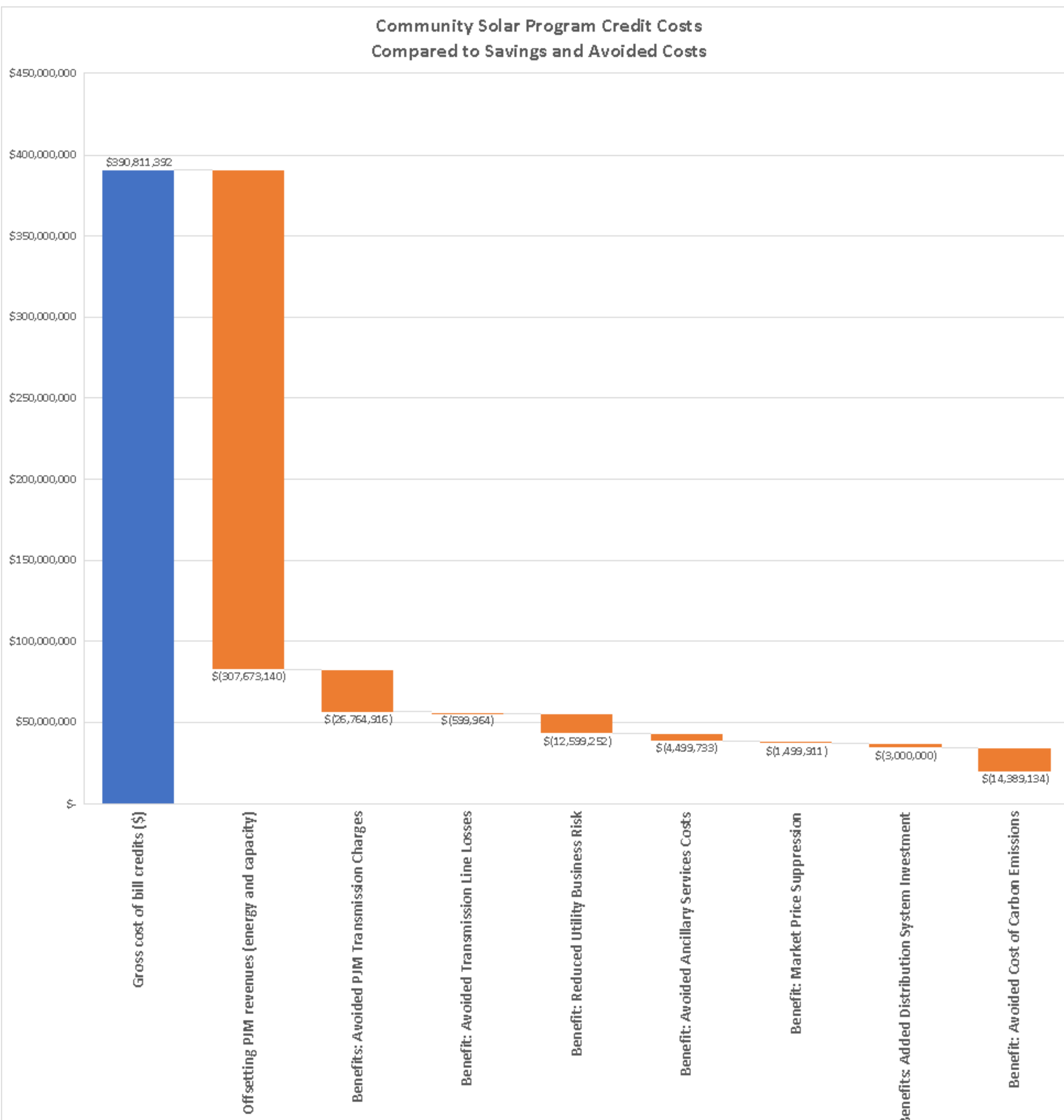
Understanding Ohio's Community Energy value proposition requires detailed analysis. This report introduces the type of comprehensive analysis that should be conducted in order to make any claims about the cost-effectiveness of Community Energy. It concludes that under an extremely conservative analysis, and with the assumption of the construction and operation of a full 1,500 MW of Community Energy facilities for an entire year, non-subscriber customers could see monthly bill costs of about $0.075 (7.5 cents) per customer per month.

These estimates do not account for additional and significant job and economic benefits that would accrue to Ohioans from the construction and operation of Community Energy facilities across the state, as well as the increased spending power and residual economic impact that comes from customers saving on their electric bills. When you factor in these economic benefits, not to mention the ability to develop distressed and brownfield sites that otherwise have no value, the benefits of the Community Energy program significantly outweighs the total cost of bill credits.[1]

[1]See, e.g., Maryland Value of Solar Study, available at https://www.psc.state.md.us/wp-content/uploads/MD-Costs-and-Benefits-of-Solar-Draft-for-stakeholder-review.pdf

Ohio would benefit from reduced dependence on energy imports as well. According to the U.S. Energy Information Administration's 2021 analysis, "because in-state generation does not meet consumer demand, Ohio typically imports between about one-fifth and one-fourth of the electricity it needs each year from other states and Canada by way of the regional grid."[2] A key benefit of deploying and operating Community Energy in Ohio is that it avoids costly dependence on grid imports and the transmission grid needed to deliver that energy, and reduces the state's dependence on fluctuating energy prices from its neighboring states and foreign governments.

Finally, Community Energy brings the risk reduction, environmental, and market premium benefits of distributed energy to Ohio communities and neighborhoods. A partial accounting of utility system benefits doesn't tell the whole story. If all the real and realizable benefits of Community Energy are accounted for, the proposed 1,500 MW program pays for itself and results in additional benefits on top.




[2]U.S. EIA, Ohio Electricity Profile 2021, Table 10, Supply and disposition of electricity, 1990 through 2021.

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

### B. Elements of Analysis

**a. Conservative Approach —** This high-level analysis was designed to provide indicative values for the costs and benefits (avoided costs) of a 1,500 MWac Community Energy program, with a focus on utility system benefits. Net costs were calculated by subtracting PJM energy and capacity values from utility Community Energy credit costs. Only utility sales and customer data from 2022 was used in order to facilitate comparability with other analysis provided to the legislature. Those costs, and the benefits of Community Energy, are certain to rise in the coming years. Ohio doesn't have a definitive "value of distributed energy resources" study on the books, so benefits values from other states were reviewed. Where those values differed significantly, the lower value, or the values from another state located in the PJM system were used—again, to ensure conservative estimates. In addition, Ohio-specific values for distribution system capacity costs, distribution line losses, and distribution operating costs were not included in benefits because Ohio utilities do not report this data, though Community Energy generation can reduce these costs as well. That is, even though  subtracts the full amount of distribution costs from the credits paid to Community Energy subscribers, these facilities actually reduce some of these costs as well. Finally, no special locational values were assumed for the siting and operation of Community Energy facilities, even though utilities could realize even greater operational and reliability-related savings by encouraging Community Energy facility siting in the highest-value locations on the grid.

**b. Program Size, Energy Generation —** This analysis assumes a program size to allow 1,500 MWac of Community Energy allocated among six utility operating companies—Ohio Power, Toledo Edison, Cleveland Electric, Ohio Edison, Duke Energy Ohio, and Dayton Power & Light. The full program could eventually meet the energy needs of about 285,000, or about 14% of, average residential customers, assuming current customer counts and usage.

**c. The direct grid-related benefits from Community Energy that produces include:**

**Rebuilding the Distribution Grid:** Community Energy deploys private, non-utility capital to rebuild the distribution system, often investing millions of dollars to replace and update infrastructure that is decades old.

**Avoided Transmission:** Community Energy creates local energy, avoiding use of the bulk transmission system and delaying the need to build costly and politically divisive transmission lines. Further, creating energy closer to where it's needed frees up capacity on existing transmission lines enabling more large scale generation projects at lower costs and maximizing ratepayer benefits from previous utility investments that all customers are already paying for.

**Fuel Diversity:** Distributed generation adds to the overall generation mix, reducing the need for the utility to purchase and transport fuels to existing power plants to meet demand. Solar and other renewable energy used for Community Energy projects hedges against volatile fuel price spikes caused by geopolitical events and fuel shortages.

**Peak Load Reduction:** By providing power at peak times, distributed generation projects also reduce the need to run expensive peaker plants, which carry the highest marginal costs of all utility generation infrastructure.

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

**Capital Investment Deferral:** Distributed generation helps flatten energy usage during peak times, which lessens the need for "lumpy" capital investment in the generation, transmission, and distribution systems and allows for the deferral or avoidance of those projects.

**Line Loss Reduction:** Traditional centralized energy generation incurs losses along transmission lines. By siting projects closer to end-use customers, distributed generation can reduce transmission and distribution losses, on the order of 3-6% for transmission and 5-8% for distribution. These benefits are even higher during peak demand periods, when transmission and distribution systems are under highest stress.

**Ancillary Services:** Distributed generation projects provide additional services, such as voltage control and operating reserves, which help the utility maximize the efficiency of the grid, maintain the reliability, and increase competitiveness of energy markets.

**C. Key Takeaways — The key takeaways from this high level analysis are:**

- A 1,500 MWac Community Energy program in Ohio will reduce Ohio's dependence on imported energy while building a strong locally-based electricity generation sector.
- The cost impacts of a 1,500 MWac Community Energy program in Ohio would be offset by the benefits realized.
- Further analysis can reveal additional benefits.

## II. Key Assumptions

**A. Actual Costs and Benefits May Vary —** This high-level analysis relies on estimates and averages. It assumes full subscription and operation of a 1,500 MWac Community Energy program, even though the actual enrollment and construction period will extend for years. Offsetting energy and capacity values are wholesale values only, and are based on 2022 market data only, even though these values will most certainly rise in the future. And it relies on data from other states until local and Ohio-specific data can be collected and analyzed. Estimating utility costs, and "avoided costs," is complicated and ultimately somewhat subjective. Utilities often claim lost sales or "lost revenues" as a cost, even though they are not actual program costs. Advocates frequently argue for a wide range of direct, and indirect, savings benefits. And all estimates require, in a word, estimation. For these reasons, this analysis takes a conservative approach.

**B. Program Size, Credit Volume —** Program build-out allocation, Community Energy production estimates, and bill credit costs are set out in the table below.

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

## Key Analysis Assumptions for 1,500 MWac Community Energy Program in Ohio

| | AEP | ATSI | ATSI | ATSI | DAY | DEO&K |
|---|---|---|---|---|---|---|
| | Ohio Power Co | The Toledo Edison Co | Cleveland Electric Illum Co | Ohio Edison Co | Duke Energy Ohio Inc | Dayton Power & Light Co |
| | Residential | Residential | Residential | Residential | Residential | Residential |
| Program Allocation (MWac) | 605.1 | 60.5 | 128.7 | 251.4 | 243.1 | 211.1 |
| Community solar production (MWh)-Distressed (Retail minus Distribution Costs | 362,410 | 36,255 | 77,073 | 150,582 | 145,616 | 126,444 |
| Community solar production (MWh)-Non-Distressed (Retail minus Distribution Costs) | 847,730 | 84,805 | 180,285 | 352,234 | 340,618 | 295,771 |
| Bill Credit ($/kWh) Rooftop or Distressed | $0.12 | $0.13 | $0.13 | $0.12 | $0.09 | $0.13 |
| Bill Credit ($/kWh) Ground-Mounted Non-Distressed | $0.12 | $0.13 | $0.13 | $0.12 | $0.09 | $0.13 |

## III. Costs of Community Energy Credits

**A. Breakdown of Program Size by Utility —** In this analysis, the 1,500 MWac Community Energy program is allocated among the six Ohio investor-owned utilities according to respective shares of residential electricity sales, as reported by the U.S. Energy Information Administration ("EIA"). Using this data, these shares range from about 40% of residential sales for Ohio Power, down to about 4% of sales for Toledo Edison.

**B. Breakdown of Credit Costs by Utility and Impacts on Non-Subscriber Customers —** As shown in the table above, this analysis assumes credit rates equal to the full retail rate less the distribution energy charge for all 1,500 Mwac in the Community Energy program.

## IV. Savings from Utility Avoided Energy and Capacity

**A. Elements of Energy and Capacity Savings —** This analysis conservatively uses 2022 data from the PJM market to estimate the value of wholesale power that utilities do not have to purchase, import, or generate as a result of the solar power that Community Energy facilities generate. The value of these avoided energy and capacity purchases will only increase over the years that Community Energy facilities operate once constructed.

**B. Energy and Capacity Savings —** Community Energy generation is highly effective at reducing the costs of wholesale market purchases, imports, and generation, even with a program size of only 1,500 MWac. Wholesale market savings pay for about 86% of the cost of Community Energy credits needed to run a program that is cost-effective for customers and developers.

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

## V. Savings from Utility Avoided Transmission Costs

**A. PJM Transmission Service Rates —** Dependence on the wholesale grid for electric generation and capacity also entails costs related to PJM transmission services. Imported energy from Canada and other states must travel great distances to serve customers in Ohio, adding to the costs of imported power, and increasing the savings realized from locally-generated electricity. These utility-specific charges for whole transmission services are avoided by Community Energy facilities, reflecting about $27 million in total program savings.

**B. Transmission Construction Cost Savings —** Community Energy generation also helps avoid or defer the capital costs of new transmission infrastructure. Because the value of these savings varies by utility and construction plans, no benefits value was assigned in this analysis. A more detailed analysis, using utility-specific data, will likely demonstrate significant additional value from transmission construction value that can be avoided or deferred as a result of increased deployment of Community Energy generation.

## VI. Distribution System Investment Benefits from Community Energy

**A. Contributions to System Distribution Investments from Community Energy Projects —** Community Energy developers are required to pay for the distribution system upgrades that enable their facilities to interconnect safely to the grid. These investments improve the overall quality of the distribution grid, enabling grid modernization and reliable operations. These investments represent a positive additional benefit that Community Energy brings to distribution infrastructure.

**B. Facility-Specific Distribution Savings from Community Energy Projects —** Community Energy generation facilities, especially those using advanced technologies like solar and fuel cells, garner little or no opposition from citizens and businesses, and are seen as a positive enhancement to community infrastructure. This means that thoughtful utilities can work with Community Energy developers to identify sites for these facilities that provide enhanced grid support value and improvements to overall system reliability. Because these values depend on detailed utility understanding of distribution grid conditions and costs, this analysis takes a conservative approach and does not quantify these benefits on a system-wide basis. The PUCO should direct utilities to work with Community Energy developers once the program is launched in order to explore how to capture location-specific distribution system value associated with Community Energy deployment and operations.

## VII. Other Savings and Benefits from Community Energy

In this analysis, values were included for several benefits typically associated with distributed generation. These include not just offsetting savings in energy and capacity costs, but also other costs avoided by the utility when Community Energy facilities generate electricity that is injected into the distribution grid. Counting only avoided wholesale energy costs doesn't tell the whole story of what it costs to run a grid, and how those costs can be reduced by local Community Energy generation.

These include the following:

**A. Avoided Network Integration Transmission Service Charges —** These are charges imposed by the PJM system for transmission services. These charges vary by utility, generally go up over time, and are associated with transmission-level services that distributed Community Energy generators do not need.

1350 Gaylord Street, Denver, Colorado 80206
TEL: 512.968.7543
EMAIL: karl@rabagoenergy.com
WEB: rabagoenergy.com

**B. Avoided Transmission Line Losses —** Energy is lost when electricity causes transmission lines to get hot due to resistance and due to efficiency losses in switching and transforming energy. These costs vary with the level of system use and are avoided by Community Energy facilities operating at distribution level.

**C. Reduced Utility Business Risk —** A utility with more non-utility generation and a diverse portfolio of generation technologies is less risky to operate and maintain. This reduces business risk for utilities, often justifying more competitive rates of return while maintaining strong credit metrics. In addition, Community Energy generation reduces dependence on fuel price volatility, imported energy, and prices that increase with system load. This reduced business risk associated with adding distributed Community Energy generation is estimated based on values seen in other utilities.

**D. Avoided Ancillary Services Costs —** Large scale grids require and charge for a range of ancillary services that maintain reliability, stability, and efficient operations. These services include voltage regulation, ramping, and others. Distributed generation, like Community Energy, helps utilities avoid these costs.

**E. Market Price Suppression Benefit —** Wholesale market prices are driven by demand, and fall when demand is reduced. Distributed generation, like Community Energy, reduces the intensity of wholesale demand, and markets respond with lower prices. This price suppression effect is reflected in lower wholesale prices and is a direct benefit of load reductions that align with periods of higher demand.

## VIII. Conclusions

A. Even under a very conservative approach, Community Energy development under a 1,500 MWac program offers significant benefits that substantially offset program costs.

B. Under more careful and detailed analysis, and relying upon utility-specific data, it is all but certain that a Community Energy program will generate even greater net savings in utility costs, especially wholesale power import costs, plus local and statewide economic benefits that more than fully offset Community Energy program costs.

C. Community Energy development can bring competitive energy generation and related benefits to all of Ohio served by investor-owned utilities. Community Energy subscribers can see bill savings under the program. When benefits and avoided costs are accounted for, non-subscribers would see no average monthly bill increase from a Community Energy program, even under conservative assumptions, including that the entire proposed program started operating on day one.